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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,229	09/30/2003	Yasuhiro Sekiguchi	501558.20002	6378

26418 7590 02/22/2006

REED SMITH, LLP

ATTN: PATENT RECORDS DEPARTMENT
599 LEXINGTON AVENUE, 29TH FLOOR
NEW YORK, NY 10022-7650

EXAMINER

HSIEH, SHIH WEN

ART UNIT	PAPER NUMBER
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2861

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/676,229

Applicant(s)

SEKIGUCHI, YASUHIRO

Examiner

Shih-wen Hsieh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-10, 12, 13, 17-20 and 22-24 is/are rejected.
- 7) ☒ Claim(s) 6, 7, 11, 14-16 and 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12-12-05 (fig. 1) is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Response to Amendment

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22 recites: "wherein each adjacent pair of said pressure chambers are spaced apart from each other by said first spacing pitch, except said at least one adjacent pair of said pressure chambers that are spaced apart from each other by said second spacing pitch". Claim 22 indirectly depends on claim 19, wherein claim 19 recites: "**wherein said nozzles arranged in each of said at least one row are spaced apart from each other by a first spacing pitch**, while at least one adjacent pair of said pressure chambers are spaced apart from each other by a second spacing pitch that is larger than said first spacing pitch". The underlined portion above and the bold-face

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portion above refers to different subject matters. Should the subject matter of "said nozzles arranged in each of said at least one row" in claim 19 be changed to: "wherein each adjacent pair of said pressure chambers are spaced apart from each other" so as to match first spacing pitch for each adjacent pair of said pressure chambers in claim 22? Please clarify.

For art rejection to claim 22 at this time.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-5, 8-10, 12, 13, 17-20 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson (US Pat. No. 5,489,930).

In regard to:

Claim 1:

Anderson teaches:

An ink-jet printing head comprising a cavity unit (10, fig. 2) and an actuator (88, fig. 2) which are superposed on each other,

wherein said cavity unit is a laminar structure including a plurality of plates (20, 22, 24, 26, 28, 30, 32 and 34, figs. 1 and 2) superposed on each other in a vertical

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direction of said cavity unit, and has (a) a plurality of nozzles (44, figs. 1B and 2) which are open in a surface thereof that is to be opposed to a print media and which are arranged in at least one row, (b) a plurality of pressure chambers (72, figs. 1A, 2 and 6) which are arranged in a direction of said at least one row of said nozzles, (c) a plurality of communication passages (74, 76 and 108, fig. 2) for communication between the respective pressure chambers and the respective nozzles, and (d) a manifold portion (54, figs. 2 and 6) which stores an ink supplied from an ink supply source and re-fills the pressure chambers, refer to col. 4, lines 7-63.

The device of Anderson DIFFERS from claim 1 in that it does not teach:

wherein said actuator has a plurality of active portions which correspond to said pressure chambers, respectively, and which are selectively operable to eject the ink from the corresponding nozzles.

Anderson et al.'s pressure transducer has a piezoelectric ceramic disc (90), generally such a disc consists of a plurality of active portions, which is the same as another type of actuator, which is electric heaters or electrothermal converters or simply resistors. No matter which type of actuator, printing of an image on a media by an ink jet printer using either type of actuator is by selectively ejection of ink droplets through the energizing of the corresponding actuators based on the input printing signal, refer to MPEP 2144.03, In re Malcolm, 129 F.2d 529, 54 USPQ 235 (CCPA 1942). Anderson's invention is emphasizes in his filter part, the pressure transducer is not his main concern, therefore, not too many details is given in his invention regarding to the pressure transducer.

Therefore it would have been an obvious matter that the pressure transducer will be in a plurality form such that selected pressure chamber(s) will be deformed to eject ink droplet upon receiving a driving signal.

Anderson further teaches:

wherein said pressure chambers are arranged with a first spacing pitch between each adjacent pair of said pressure chambers, except at least one adjacent pair of said pressure chambers which are spaced apart from each other by a second spacing pitch that is larger than said first spacing pitch, refer to fig. 6

and wherein each of said communication passages includes at least one horizontally extending portion (108, fig. 2) which extends in parallel with a horizontal direction of said cavity unit, refer to col. 5, lines 1-17.

Claim 19:

An inkjet printing head comprising a cavity unit and an actuator which are superposed on each other,

wherein said cavity unit is a laminar structure including a plurality of plates superposed on each other in a vertical direction of said cavity unit, and has (a) a plurality of nozzles which extend in the vertical direction of said cavity unit, which are open in a surface thereof that is to be opposed to a print media, and which are arranged in at least one row, (b) a plurality of pressure chambers which are arranged in a direction of said at least one row of said nozzles, (c) a plurality of communication passages for communication between the respective pressure chambers and the

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respective nozzles, and (d) a manifold portion which stores an ink supplied from an ink supply source and re-fills the pressure chambers,

wherein said actuator has a plurality of active portions which correspond to said pressure chambers, respectively, and which are selectively operable to eject the ink from the corresponding nozzles,

wherein said nozzles arranged in each of said at least one row are spaced apart from each other by a first spacing pitch, while at least one adjacent pair of said pressure chambers are spaced apart from each other by a second spacing pitch that is larger than said first spacing pitch,

and wherein each of said communication passages includes at least one horizontally extending portion which extends in parallel with a horizontal direction of said cavity unit.

Rejection:

This claim is rejected on the basis as set forth for claim 1 discussed above. A difference between this claim and claim 1 is the pitches. For this, please refer to fig. 1B, nozzle plate 34 and fig. 1A, pressure chamber plate 22.

Claim 2:

An ink-jet printing head according to claim 1,

wherein said actuator includes of a plurality of mutually independent actuator units which are disposed such that end faces of each of at least one adjacent pair of said actuator units are opposed to each other in said direction of said at least one row of said nozzles, each of said actuator units having a length covering a predetermined

number of said pressure chambers which are arranged in said direction of said at least one row of said nozzles,

and wherein said end faces of each of said at least one adjacent pair of said actuator units are located between a corresponding one of said at least one adjacent pair of said pressure chambers which are spaced apart from each other by said second spacing pitch.

Rejection:

This claim is rejected on the basis as set forth for claim 1 discussed above, also please refer to figs. 1A, the pressure chamber plate 22; and fig. 6, the pressure chamber plate 22.

Claim 3:

Anderson further teaches:

wherein each of said communication passages consists of said at least one horizontally extending portion (108, fig. 2) and at least one vertically extending portion (74, fig. 2) which extends in parallel with said vertical direction of said cavity unit, refer to col. 4, line 35 to col. 5, line 17.

Claim 4:

Anderson further teaches:

wherein each of said at least one horizontally extending portion is provided by a horizontally extending recess which is formed in a recess-defining plate (30, fig. 2) that is one of said plates and which extends in a direction parallel to said recess-defining plate, refer to col. 5, lines 15-16.

Claim 5:

wherein each of said pressure chambers is elongated in a direction perpendicular to said direction of said at least one row of said nozzles, and is held in communication at a longitudinal end portion thereof with a corresponding one of said communication passages,

and wherein said horizontally extending recess has opposite end portions, one of which is aligned with said longitudinal end portion of a corresponding one of said pressure chambers in said vertical direction of said cavity unit, and the other of which is aligned with a corresponding one of said nozzles in said vertical direction, refer to figs. 1A and 2. Since the pressure transducer (88) is two-dimensional (longitudinal and transverse), it is therefore also elongated in a direction perpendicular to the direction of the at least one row of the nozzles. And also from fig. 2, the two opposite end portions of the channel plate (30, corresponding to the horizontally extending recess in this claim) aligned with one end of the pressure chamber (72), and nozzle (44) respectively.

Claim 8:

An ink-jet printing head according to claim 4, wherein said horizontally extending recess is formed in one of opposite surfaces of said recess-defining plate that is closer to said pressure chambers.

Rejection:

Refer to fig. 2, this "one of opposites surfaces of said recess-defining plate that is closer to said pressure chambers" can be seen as the surface, which is in contacting with a lower surface of a separator plate (28).

Claim 9:

An ink-jet printing head according to claim 2, wherein said plurality of mutually independent actuator units include two actuator units as said each of said at least one adjacent pair of said actuator units,

wherein said plurality of pressure chambers include two groups of pressure chambers which correspond to said two actuator units, respectively,

wherein said communication passages include two groups of communication passages which are held in communication with said two groups of pressure chambers, respectively,

and wherein the communication passages of one of said two groups and the communication passages of the other of said two groups are formed symmetrically with each other with respect to a plane which is parallel to said vertical direction and which is perpendicular to said direction of said at least one row of said nozzles.

Rejection:

This claim is rejected on the basis as set forth for claim 1 discussed above, beside, based on the layouts indicated in figs. 1A, the pressure chamber plate 22; fig. 2 the pressure transducer (88); and fig. 6 the pressure chamber plate 22, the pressure transducer (88, the actuator) can be seen as consisting two actuator units, one of each covers left half of the pressure chamber (72) and the right half of the pressure chamber (72) respectively, and based on this, then the communication passages are also divided into two groups, each one of the group associated with its pressure transducer, and the symmetrical with each other can also be seen from fig. 6.

Claim 10:

Anderson further teaches:

wherein said pressure chambers are formed in a pressure-chamber-defining plate (22, fig. 2) which is one of said plates and which is contiguous to said recess-defining plate (30, fig. 2).

Claim 12:

Anderson further teaches:

wherein said nozzles arranged in each of said at least one row are spaced apart from each other by said first spacing pitch, refer to fig. 1B, plate 34 for the pitch.

Claim 13:

Anderson teaches two rows of nozzles as that can be seen in fig. 1B.

Therefore the device of Anderson DIFFERS from claim 13 in that it does not teach:

wherein said nozzles are arranged in four rows,
and wherein said active portions of said actuators are arranged in four rows each of which is parallel to a corresponding one of said four rows of said nozzles.

Four rows of nozzle are commonly seen in ink jet printer, typically each row associated with cyan, magenta, black and yellow color ink respectively.

Therefore it would have been an obvious matter that a two rows head can be modified into a four rows head, since both types of head are well known in the art, refer to MPEP 2144.03, in re Malcolm, 129 F.2d 529, 54 USPQ 235 (CCPA 1942).

If there are four rows of nozzles, then it is generally arranging the active portions of said actuators in four rows each of which is parallel to a corresponding one of said four rows of said nozzles so as to activate their corresponding rows of nozzles upon receiving a printing signal.

Claim 17:

Anderson further teaches:

wherein said actuator includes a first piezoelectric sheet (92, fig. 2, the one on top of the PZT ceramic disc 90) formed with individual electrodes and a second piezoelectric sheet (92, the one contacts with the diaphragm plate 20) formed with a common electrode, said first and second piezoelectric sheets being superposed on each other,

and wherein said active portions (90) are defined between said individual electrodes and said common electrode.

Note: one sheet has individual electrodes and the other has a common electrode are a very common arrangement for a piezo electrical actuator, refer to MPEP 2144.03, in re Malcolm, 129 F.2d 529, 54 USPQ 235 (CCPA 1942). Beside, as discussed above, the main point in Anderson's invention is the filter, therefore, there is not too much details given to the piezoelectric.

Claim 18:

Anderson further teaches:

wherein said pressure chambers are arranged in two rows in a zigzag pattern, refer to fig. 6

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wherein said nozzles are arranged in two rows in a zigzag pattern which are located between said two rows of said pressure chambers (note: zigzag, per se, is offset, so Anderson's two rows of nozzles are offset with each other),

and wherein said communication passages are arranged in two rows in a zigzag pattern each of which is located between a corresponding one of said two rows of said nozzles and a corresponding one of said two rows of said pressure chambers. Note: since the two rows of nozzles are offset, then their corresponding communication passages are also offset.

Claim 20:

An inkjet printing head according to claim 19, wherein each of said communication passages consists of said at least one horizontally extending portion and at least one vertically extending portion which extends in parallel with said vertical direction of said cavity unit.

Rejection:

The recitation of this claim is the same as that in claim 3, and is rejected on the basis as set forth for claim 3 discussed above.

Claim 22:

An ink-jet printing head according to claim 20, wherein each adjacent pair of said pressure chambers are spaced apart from each other by said first spacing pitch, except said at least one adjacent pair of said pressure chambers that are spaced apart from each other by said second spacing pitch.

Claim 23:

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Anderson further teaches:

wherein said plurality of communication passages have substantially the same length between said respective pressure chambers and said respective nozzles, refer to fig. 2 regarding the length of the communication passages. Since fig. 6 is just a sample explanation of Anderson's invention, the communication passage between the pressure chamber (72) and nozzle (44) should be the same to the rest passages.

Claim 24:

An ink-jet printing head according to claim 3, wherein each of said communication passages consists of a single horizontally extending portion as said at least one horizontally extending portion and a single vertically extending portion as said at least one vertically extending portion,

and wherein said communication passages are the same to each other with respect to a length of said horizontally extending portion and a length of said vertically extending portion.

Rejection:

This claim is rejected on the basis as set forth for claims 3 and 23 discussed above.

Allowable Subject Matter

6. The indicated allowability of claim 13 is withdrawn in view of the newly discovered reference(s) to Anderson. For rejections, please refer to the office action above.

7. Claims 6, 7, 11, 14-16 and 21 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

In regard to:

Claims 6, 7 and 16:

The primary reason for the allowance of claims 6, 7 and 16 is the inclusion of the limitations of wherein said communication passages include first and second communication passages which are alternately arranged in said direction of said at least one row of said nozzles, and which communicate with said first and second pressure chambers, respectively, and wherein said recess providing each of said at least one horizontally extending portion of each of said first communication passages is formed in one of opposite surfaces of said recess-defining plate, while said recess providing each of said at least one horizontally extending portion of each of said second communication

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passages is formed in the other of said opposite surfaces of said recess-defining plate.

It is these limitations found in each of the claims, as they are claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes these claims allowable over the prior art.

Claim 11:

The primary reason for the allowance of claim 11 is the inclusion of the limitation of wherein said recess-defining plate is interposed between said pressure-chamber-defining plate and at least one of said plates in which said manifold portion is formed. It is this limitation found in this claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Claim 14:

The primary reason for the allowance of claim 14 is the inclusion of the limitation of wherein each of said at least one horizontally extending portion extends in a direction inclined with respect to said direction of said at least one row of said nozzles. It is this limitation found in this claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Claim 15:

The primary reason for the allowance of claim 15 is the inclusion of the limitation of wherein one of said opposite end portions of said horizontally extending recess is larger in area than the other. It is this limitation found in this claim, as it is claimed in the

combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Claim 21:

The primary reason for the allowance of claim 21 is the inclusion of the limitation of a recess-defining plate in which at least one horizontally extending recess that provides said at least one horizontally extending portion is formed, and which is contiguous to said pressure-chamber-defining plate and interposed between said pressure-chamber-defining plate and said manifold-defining plate. It is this limitation found in this claim, as it is claimed in the combination that has not been found, taught or suggested by the prior art of record, which makes this claim allowable over the prior art.

Response to Arguments

9. Applicant's arguments with respect to claims 1-24 have been considered but are moot in view of the new ground(s) of rejection.

US 5,489,930 to Anderson is used in this office action.

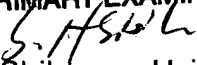
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shih-wen Hsieh whose telephone number is 571-272-2256. The examiner can normally be reached on 7:30AM -5:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, S D. Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SHIH-WEN HSIEH
PRIMARY EXAMINER


Shih-wen Hsieh
Primary Examiner
Art Unit 2861

SWH



Feb. 17, 2006